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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 10/726,944	Applicant(s) AGRAWAL ET AL.	
	Examiner CHUONG T. HO	Art Unit 2664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35* is/are allowed.

6)☒ Claim(s) *1-14,17-29 and 32-34* is/are rejected.

7)☒ Claim(s) *15,16,30 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Claims 1-35 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 8, 9-11, 12, 20-27, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al. (U.S.Patent No. 2003/0165131 A1) in view of Bae et al. (U.S.Patent No. 2002/0097697 A1).

Regarding to claim 1, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in

the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;

- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols 44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division

multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

3. In the claims 2, Liang discloses the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) (see page 1, [0004] [0005]) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM) (see page 1, [0004] [0005]).

4. In the claim 21, claim 21 is rejected the same reason of claim 2 above.

5. In the claim 3, Liang discloses the limitation of claim 1 above.

However, Liang is silent to disclosing the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips

Bae discloses the at least one pilot symbol is spectrally spread with the PN code (256 PN chips per slot for pilot channel, see figure 2) in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips (pilot = 128 chips, see figure 1, 12).

Both Liang, Bae discloses pilot chips and data. Bae recognizes the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread

spectrum processing to obtain the sequence of pilot chips in order to improve the performance of CDMA downlink transmissions, receivers.

6. Regarding to claim 23, claim 23 is rejected the same reason of claim 3 above.

7. In the claim 4, Liang discloses the limitations of claim 1 above.

However, Liang is silent to disclosing the PN code uniquely identifies a transmitting entity of the wideband pilot.

Bae discloses the PN code (pilot = 128 chips, see figures 1, 12) uniquely identifies a transmitting entity of the wideband (frequency band, see [0018]) pilot .

Both Liang, Bae discloses pilot chips and data. Bae recognizes the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips in order to improve the performance of CDMA downlink transmissions, receivers .

8. Regarding to claim 24, claim 24 is rejected the same reason of claim 4 above.

9. In the claim 6, Liang discloses the limitations of claim 1 above.

However, Liang is silent to disclosing scaling the sequence of pilots with a scaling factor to obtain a sequence of scaled pilot chips, wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips is time division multiplexed with the sequence of data chips.

Bae discloses scaling the sequence of pilots with a scaling factor (see page 3, [0045]) to obtain a sequence of scaled pilot chips (see page 3, [0045]), wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips (see page 3, [0045]) is time division multiplexed with the sequence of data chips (see figure 1, 12) (see page 14, [0149], If the mobile station exists in a handoff region and thus can simultaneously receive the packet data from the base stations having the high power level, the mobile station measures CIR values of the respective base stations and then transmits an index of a base station having the maximum available data rate over the reverse sector indicator channel in sync with the DRC information transmission start point, considering all the Walsh code allocation information of the respective base stations).

Both Liang, Bae discloses pilot chips and data. Bae recognizes scaling the sequence of pilots with a scaling factor to obtain a sequence of scaled pilot chips, wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips is time division multiplexed with the sequence of data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide scaling the sequence of pilots with a scaling factor to obtain a sequence of scaled pilot chips, wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips is time division multiplexed with the sequence of data chips in order to improve the performance of CDMA downlink transmissions, receivers .

10. Regarding to claim 26, claim 26 is rejected as same reason of claim 6 above.

11. In the claim 5, Liang discloses the system includes a plurality of subbands, and wherein the data symbols are sent on different ones of the plurality of subbands in different time intervals (see page 5, [0079], the transmission period of the pilot symbol) as determined by a frequency hopping (FH) sequence.

12. Regarding to claim 25, claim 25 is rejected as same reason of claim 5 above.

13. In the claims 7, 27, Liang discloses the limitations of claim 1 above.

However, Liang is silent to disclosing the TDM sequence of pilot and data chips is transmitted on a reverse link in the system .

Bae et al. discloses the TDM (see page 3, [0045]) sequence of pilot and data chips is transmitted on a reverse link in the system .

Both Liang, Bae discloses pilot chips and data. Bae recognizes the TDM sequence of pilot and data chips is transmitted on a reverse link in the system. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide the TDM sequence of pilot and data chips is transmitted on a reverse link in the system in order to improve the performance of CDMA downlink transmissions, receivers.

14. In the claim 8, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol

with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;
- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols 44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time

division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

15. Regarding to claim 9, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- A modulator (see page 2, [0012], each of the multiple parallel low-rate streams is modulated using a different sub-carrier) operative to process data symbols (see page 2, [0013]) in accordance with a multi-carrier modulation (see page 2, [0012] scheme to obtain a sequence of data chips (see page 2, [0019]);

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;
- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols 44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data

chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

16. In the claim 10, Liang discloses the limitations of claim 1 above.

However, Liang is silent to disclosing a terminal..

Bae et al. discloses a terminal (see abstract).

Both Liang, Bae discloses pilot chips and data. Bae recognizes a terminal. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide a terminal in order to improve the performance of CDMA downlink transmissions, receivers.

17. In the claim 11, Liang discloses the limitations of claim 1 above.

However, Liang is silent to disclosing a base station.

Bae et al. discloses a base station (see abstract).

Both Liang, Bae discloses pilot chips and data. Bae recognizes a base station. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention

invention to modify the system of Liang with the teaching of Bae to provide a base station in order to improve the performance of CDMA downlink transmissions, receivers.

18. In the claim 12, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;
- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols

44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

19. In the claim 20, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol

with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;
- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols 44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time

division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]);

Summing (see page 5, [0060]) the sequence of pilot chips with the sequence of data chips to obtain a sequence of combined pilot and data chips (see figures 12, 13, [0085] [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

20. In the claim 22, Liang discloses the limitations of claim 20 above.

However, Liang is silent to disclosing the wideband pilot is transmitted continuously for the duration of the sequence of data chips

Bae et al. discloses the wideband (frequency band) pilot is transmitted continuously for the duration (period of time) of the sequence of data chips (see figures 12, 13, [0085] [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes the wideband (frequency band) pilot is transmitted continuously for the duration (period of time) of the

sequence of data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide the wideband (frequency band) pilot is transmitted continuously for the duration (period of time) of the sequence of data chips in order to improve the performance of CDMA downlink transmissions, receivers.

21. In the claim 28, Liang discloses, see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52 (see page 5, [0080], figure 4); comprising:

- Processing at least one pilot symbol (see page 5, [0080], figure 4, the pilot symbols are generated in the frequency domain and later converted back to the time domain and time-multiplexed with spread data. Unlike the packet 40 for data independent pilot symbols, every block for the new packet structure has a data dependent pilot symbol with pilot chips. The pilot chips 56 for the block 52 is based upon the data 54 for that block 52) with a pseudo-random number (PN) code (spread codes) (see page 5, [0077], Data symbols 44 and pilot symbols in the OFDM block 42 for each of the users are individually spread with user-specific spread codes) to obtain a sequence of pilot chips for the wireband (frequency band, see page 1, [0006]) pilot;

- Processing data symbols in accordance with a multi-carrier modulation scheme (see page 5, [0077], these pilot symbols are placed together as an orthogonal frequency division multiplexing (OFDM) block 42 and is common to data symbols 44 for all users. Data symbols 44 and pilot symbols in the OFDM bock 42 for each of the users are individually spread with user-specific spread codes);

However, Liang is silent to disclosing time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips.

Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]);
Summing (see page 5, [0060]) the sequence of pilot chips with the sequence of data chips to obtain a sequence of combined pilot and data chips (see figures 12, 13, [0085] [0086]).

Both Liang, Bae discloses pilot chips and data. Bae recognizes time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Liang with the teaching of Bae to provide time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division

multiplexed (TDM) sequence of pilot and data chips in order to improve the performance of CDMA downlink transmissions, receivers.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. Claims 13-14, 17, 18, 19, 29, 32-33, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al. (U.S.Patent No. 2002/0097697 A1) in view of Liang et al. (U.S.Patent No. 2003/0165131 A1).

Regarding to claim 13, Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

- Obtaining a sequence of received chips (see figure 12) that includes a time division multiplexing (see figure 2, 230) sequence of received pilot and data chips (see figure 12, [0085], figure 13, [0086]);
- Demultiplexing (701) (figure 14) the sequence of received chips (see figure 12, page 10, [0089]) to obtain a sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) for the wideband (frequency band) (see page 2, [0018])

pilot and a sequence of received data chips (see figure 12, [0085], figure 13, [0086]);

- Processing the sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) with a pseudo-random number (PN) code (see figure 14, PN chips per chip for burst pilot channel) to obtain a plurality of channel for a plurality of subbands (subchannels) (see page 11, the pilot subchannel demodulator corresponds to the elements 713- 715 of FIG.14);
- Processing (see figure 14, [0089]) the sequence of received data chips in accordance with a multi-carrier demodulation (demodulator 715) (see figure 14) scheme and with the plurality of channel response estimates to obtain recovered data symbols (see figure 12, page 10, [0085], figure 13, page 10, [0086]);

However, Bae et al. is silent to disclosing a plurality of channel response estimates for a plurality of subbands.

Liang et al. discloses processing the sequence of received pilot chips (see page 5, [0080]) with a pseudo-random number (spread code) to obtain of channel response estimate (response channel estimation, see page 9, [0130]) for a plurality of subbands; and processing the sequence of received data chips (see page 7, [0109]) in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates (response channel estimation) to obtain recovered data symbols (see page 6, [0102]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes a plurality of channel response estimates for a plurality of subbands. Thus, it would have been

obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide a plurality of channel response estimates for a plurality of subbands in order to improve the performance of CDMA downlink transmissions, receivers.

24. In the claims 14, 33, Bae discloses the limitations of claim 13 above.

However, Bae is silent to disclosing the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM).

Liang discloses the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) (see page 1, [0004] [0005]) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM) (see page 1, [0004] [0005]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes disclosing the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide disclosing the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier modulation scheme is

orthogonal frequency division multiplexing (OFDM)in order to improve the performance of CDMA downlink transmissions, receivers.

25. Regarding to claim 33, claim 33 is rejected the same reason of claim 14 above.

26. In the claim 17, Bae et al. discloses the system includes a plurality of subbands (the pilot subchannel, see page 11, [0094]), and wherein the recovered data symbols (data symbols, see page 10, [0085] [0086]) are obtain from different ones of the plurality of subbands (subchannel, see page 11, [0094]) in different time intervals (period of time, see [0077] [0082]) as determined by a frequency hopping (FH) sequence (see page 5, [0060], A quadrature spreader 510 complex-spread (or complex-multiply) an input signal comprised of the signals output from the first and second summers 501 and 502, using a spreading sequence comprised of a first-channel spreading sequence and a second-channel spreading sequence, and then outputs a first-channel signal and a second-channel signal. The first-channel signal from the quadrature spreader 510 is lowpass-filtered by a lowpass filter 521, and the second-channel signal from the quadrature spreader 510 is lowpass-filtered by a lowpass filter 522. The output of the lowpass filter 521 is multiplied by a first frequency cos2.pi.f.sub.ct by a frequency shifter 531 and thus, shifted to an RF band).

27. In the claim 18, Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230)

sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

- Obtaining a sequence of received chips (see figure 12) that includes a time division multiplexing (see figure 2, 230) sequence of received pilot and data chips (see figure 12, [0085], figure 13, [0086]);
- Demultiplexing (701) (figure 14) the sequence of received chips (see figure 12, page 10, [0089]) to obtain a sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) for the wideband (frequency band) (see page 2, [0018]) pilot and a sequence of received data chips (see figure 12, [0085], figure 13, [0086]);
- Processing the sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) with a pseudo-random number (PN) code (see figure 14, PN chips per chip for burst pilot channel) to obtain a plurality of channel for a plurality of subbands (subchannels) (see page 11, the pilot subchannel demodulator corresponds to the elements 713- 715 of FIG.14);
- Processing (see figure 14, [0089]) the sequence of received data chips in accordance with a multi-carrier demodulation (demodulator 715) (see figure 14) scheme and with the plurality of channel response estimates to obtain recovered data symbols (see figure 12, page 10, [0085], figure 13, page 10, [0086]);

However, Bae et al. is silent to disclosing a plurality of channel response estimates for a plurality of subbands.

Liang et al. discloses processing the sequence of received pilot chips (see page 5, [0080]) with a pseudo-random number (spread code) to obtain of channel response estimate (response channel estimation, see page 9, [0130]) for a plurality of subbands; and processing the sequence of received data chips (see page 7, [0109]) in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates (response channel estimation) to obtain recovered data symbols (see page 6, [0102]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes a plurality of channel response estimates for a plurality of subbands. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide a plurality of channel response estimates for a plurality of subbands in order to improve the performance of CDMA downlink transmissions, receivers.

28. In the claim 19, Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

- Obtaining a sequence of received chips (see figure 12) that includes a time division multiplexing (see figure 2, 230) sequence of received pilot and data chips (see figure 12, [0085], figure 13, [0086]);

- Demultiplexing (701) (figure 14) the sequence of received chips (see figure 12, page 10, [0089]) to obtain a sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) for the wideband (frequency band) (see page 2, [0018]) pilot and a sequence of received data chips (see figure 12, [0085], figure 13, [0086]);
- processing the sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) with a pseudo-random number (PN) code (see figure 14, PN chips per chip for burst pilot channel) to obtain a plurality of channel for a plurality of subbands (subchannels) (see page 11, the pilot subchannel demodulator corresponds to the elements 713- 715 of FIG.14);
- Processing (see figure 14, [0089]) the sequence of received data chips in accordance with a multi-carrier demodulation (demodulator 715) (see figure 14) scheme and with the plurality of channel response estimates to obtain recovered data symbols (see figure 12, page 10, [0085], figure 13, page 10, [0086]);

However, Bae et al. is silent to disclosing a plurality of channel response estimates for a plurality of subbands.

Liang et al. discloses a rake receivers (see page 1, [0003]) processing the sequence of received pilot chips (see page 5, [0080]) with a pseudo-random number (spread code) to obtain of channel response estimate (response channel estimation, see page 9, [0130]) for a plurality of subbands; and processing the sequence of received data chips (see page 7, [0109]) in accordance with a multi-carrier

demodulation scheme and with the plurality of channel response estimates (response channel estimation) to obtain recovered data symbols (see page 6, [0102]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes a plurality of channel response estimates for a plurality of subbands. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide a plurality of channel response estimates for a plurality of subbands in order to improve the performance of CDMA downlink transmissions, receivers.

29. In the claim 29, Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

- Obtaining a sequence of received chips (see figure 12) that includes a time division multiplexing (see figure 2, 230) sequence of received pilot and data chips (see figure 12, [0085], figure 13, [0086]);
- Demultiplexing (701) (figure 14) the sequence of received chips (see figure 12, page 10, [0089]) to obtain a sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) for the wideband (frequency band) (see page 2, [0018]) pilot and a sequence of received data chips (see figure 12, [0085], figure 13, [0086]);

- Processing the sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) with a pseudo-random number (PN) code (see figure 14, PN chips per chip for burst pilot channel) to obtain a plurality of channel for a plurality of subbands (subchannels) (see page 11, the pilot subchannel demodulator corresponds to the elements 713- 715 of FIG.14);
- Processing (see figure 14, [0089]) the sequence of received data chips in accordance with a multi-carrier demodulation (demodulator 715) (see figure 14) scheme and with the plurality of channel response estimates to obtain recovered data symbols (see figure 12, page 10, [0085], figure 13, page 10, [0086]);

However, Bae et al. is silent to disclosing a plurality of channel response estimates for a plurality of subbands.

Liang et al. discloses processing the sequence of received pilot chips (see page 5, [0080]) with a pseudo-random number (spread code) to obtain of channel response estimate (response channel estimation, see page 9, [0130]) for a plurality of subbands; and processing the sequence of received data chips (see page 7, [0109]) in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates (response channel estimation) to obtain recovered data symbols (see page 6, [0102]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes a plurality of channel response estimates for a plurality of subbands. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide a plurality of channel response

estimates for a plurality of subbands in order to improve the performance of CDMA downlink transmissions, receivers.

30. In the claim 32, Bae et al. discloses estimating interference due to the wideband pilot; and canceling the estimated interference from the sequence of received chips to obtain a sequence of received data chips, and wherein the sequence of received data chips is processed to obtain the recovered data symbols (see page [0066], mixer 713 multiplies the pilot channel signal output from the demultiplexer 701 by a Walsh code allocated to the pilot channel, and provides its output signal to a channel compensator 714. In order to demodulate a signal on the pilot channel, the channel compensator 714 performs channel compensation on the output signal of the mixer 713 using the channel information estimated in FIG. 6, and provides its output signal to a demodulator 715. Here, the "estimated channel information" refers to the I-channel component and the Q-channel component output from the channel estimator 606 shown in FIG. 6. In FIGS. 6 and 7, the I-channel component from the channel estimator 606 is represented by `u` and the Q-channel component is represented by `v`. The channel-compensated signal output from the channel compensator 714 is demodulated into burst pilot data by the demodulator 715. In addition, the output signal of the mixer 713 is provided to a carrier-to-interference (C/I) ratio measurer 716. The C/I ratio measurer 716 determines whether the packet data was subject to QAM modulation, by receiving the output signal of the mixer 713, and if so, provides an amplitude reference point for QAM demodulation).

31. In the claim 34, Bae et al. discloses time division multiplexing (TDM) (see figure 2, 230) of pilot chips (see figure 1A) with the sequence of data chips (see figure 1A) to

obtain a time division multiplexed (TDM) (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12); and transmitting the TDM (see figure 2, 230) sequence of pilot (see figure 12) and data chips (figure 12) (see page 10, [0085], [0086]); comprising:

- Obtaining a sequence of received chips (see figure 12) that includes a sequence of combined pilot and data chips transmitted by a transmitting entity, wherein the sequence of combined pilot and data chips is obtained by summing (see page 5, [0060]) a sequence of pilot chips for a wideband (frequency bands) pilot with a sequence of data chips at the transmitting entity (see figure 12, [0085], figure 13, [0086]);
- Demultiplexing (701) (figure 14) the sequence of received chips (see figure 12, page 10, [0089]) to obtain a sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) for the wideband (frequency band) (see page 2, [0018]) pilot and a sequence of received data chips (see figure 12, [0085], figure 13, [0086]);
- Processing the sequence of received pilot chips (see figure 12, [0085], figure 13, [0086]) with a pseudo-random number (PN) code (see figure 14, PN chips per chip for burst pilot channel) to obtain a plurality of channel for a plurality of subbands (subchannels) (see page 11, the pilot subchannel demodulator corresponds to the elements 713- 715 of FIG.14);
- Processing (see figure 14, [0089]) the sequence of received data chips in accordance with a multi-carrier demodulation (demodulator 715) (see figure 14)

scheme and with the plurality of channel response estimates to obtain recovered data symbols (see figure 12, page 10, [0085], figure 13, page 10, [0086]);

However, Bae et al. is silent to disclosing a plurality of channel response estimates for a plurality of subbands.

Liang et al. discloses processing the sequence of received pilot chips (see page 5, [0080]) with a pseudo-random number (spread code) to obtain of channel response estimate (response channel estimation, see page 9, [0130]) for a plurality of subbands; and processing the sequence of received data chips (see page 7, [0109]) in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates (response channel estimation) to obtain recovered data symbols (see page 6, [0102]).

Both Bae, Liang discloses pilot chips and data. Liang recognizes a plurality of channel response estimates for a plurality of subbands. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Bae with the teaching of Liang to provide a plurality of channel response estimates for a plurality of subbands in order to improve the performance of CDMA downlink transmissions, receivers.

Allowable Subject Matter

32. Claims 15, 16, 30, 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

33. The following is an examiner's statement of reasons for allowance: the prior art (20030165131, 20020097697, 20030012174, 200401144552, 20020080902) of record does not appear to teach or render obvious the claimed limitations in combination with the specific added limitations, as recited from dependent claims : "obtaining a plurality of channel gain estimates for a plurality of propagation paths for the wideband pilot, processing the plurality of channel gain estimates to obtain a sequence of chip-spaced gain values, and transforming the sequence of chip-spaced gain value to obtain the plurality of channel response estimates for the plurality of subbands".

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

34. Claim 35 are allowed.

35. The following is an examiner's statement of reasons for allowance: the prior art (20030165131, 20020097697, 20030012174, 200401144552, 20020080902) of record does not appear to teach or render obvious the claimed limitations in combination with the specific added limitations, as recited from independent claim 35: "a rake receiver operative to process a sequence of received chips with a pseudo-random number (PN) code to obtain a plurality of channel gain estimates for a plurality of propagation paths for a transmitting entity, wherein the sequence of received chips includes a sequence of combined pilot and data chips transmitted by the transmitting entity and obtained by summing a sequence of pilot chips for a wideband pilot with a sequence of data chips at

the transmitting entity; a processor operative to process the plurality of channel gain estimates to obtain a plurality of channel response estimates for a plurality of subband".

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHUONG T. HO whose telephone number is (571) 272-3133. The examiner can normally be reached on 8:00 am to 4:00 pm.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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